Effectiveness and cost of different strategies for information feedback in general practice

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SUMMARY

Aim. *The aim of this study was to determine the effectiveness and relative cost of three forms of information feedback to general practices — graphical, graphical plus a visit by a medical facilitator and tabular.*

Method. *Routinely collected, centrally-held data were used where possible, analysed at practice level. Some non-routine practice data in the form of risk factor recording in medical notes, for example weight, smoking status, alcohol consumption and blood pressure, were also provided to those who requested it. The 52 participating practices were stratified and randomly allocated to one of the three feedback groups. The cost of providing each type of feedback was determined. The immediate response of practitioners to the form of feedback (acceptability), ease of understanding (intelligibility), and usefulness of regular feedback was recorded. Changes introduced as a result of feedback were assessed by questionnaire shortly after feedback, and 12 months later. Changes at the practice level in selected indicators were also assessed 12 and 24 months after initial feedback.*

Results. *The resulting cost per effect was calculated to be £46.10 for both graphical and tabular feedback, £132.50 for graphical feedback plus facilitator visit and £773.00 for the manual audit of risk factors recorded in the practice notes. The three forms of feedback did not differ in intelligibility or usefulness, but feedback plus a medical facilitator visit was significantly less acceptable.There was a high level of self-reported organizational change following feedback, with 69% of practices reporting changes as a direct result; this was not significantly different for the three types of feedback. There were no significant changes in the selected indicators at 12 or 24 months following feedback. The practice characteristic most closely related to better indicators of preventive practice was practice size, smaller practices performing significantly better. Separate clinics were not associated with better preventive practice.*

Conclusion. *It is concluded that feedback strategies using graphical and tabular comparative data are equally cost-effective in general practice with about two thirds of practices reporting organizational change as a consequence; feedback involving unsolicited medical facilitator visits is less cost-effective. The cost-effectiveness of manual risk factor audit is also called into question.*

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Introduction

GENERAL practitioners in the National Health Service have traditionally received little information feedback, that is comparative statistics to enable review of performance. This is despite the existence of potentially useful data routinely collected by several agencies.[1] The information needs of general practitioners have generally received less attention than those of other NHS clinicians, for whom initiatives such as resource management have improved the range and quality of available information.[2-4] The absence of a similar information strategy in primary care has led to the *ad hoc* introduction of information systems and a general lack of relevant information available to practitioners.[5]

Surveys of general practitioners have consistently revealed a desire for information feedback.[6,7] However, the provision of information has a cost, and this needs to be set against any benefits which may be produced. Where family health services authorities have circulated practice activity data this has been welcomed, although no attempts have been made to measure its impact.[7-9] Some studies have measured the effects of feedback in general practice, but only on individual practitioner behaviour.[10-18] No previous study has measured the costs and effects of feedback at practice level.[19] The aim of this study was therefore to evaluate the effectiveness and relative cost of different forms of information feedback at practice level. The study evaluated a graphical display (management awareness profiles), which had previously been positively received in hospitals and primary care, but whose impact had not been assessed,[20,21] and measured the added benefit of an educational visit from a medical facilitator, since research suggests that this can improve the effectiveness of feedback.[22,23]

Method

The study was carried out over the period April 1989 to April 1992. In April 1989 all 77 general practices in the three district health authorities covered by Warwickshire Family Health Services Authority were invited to participate. Agreement was required from all partners and each practice had to nominate a spokesperson to act as the main contact point. The following data were available for all practices from the family health services authority: the proportion of doctors in the practice who had qualified since 1970, the proportion of doctors who were not United Kingdom graduates and the proportion of practices which were training practices. Practices not recruited to the study were compared with those participating. On entry to the study, participating practices completed a baseline questionnaire detailing staff, premises, clinics, computerization, experience of audit, decision-making processes and regularity of practice meetings.

In order to identify appropriate information for use in feedback a series of postgraduate meetings, or focus groups, was held in all three districts and all 77 practices were invited.[24] At these meetings general practitioners were asked to suggest information, preferably derived from routinely collected, centrally-held data, which might help them identify where their clinical care or services might be improved. Centrally-held data included data

routinely collected by the family health services authority and by child health units and hospital units in the three district health authorities. The family health services authority, district information services, and hospital information departments were then approached to see which data items could be extracted at practice level. The research team converted the available data into practice comparable information by calculating rates either as per 1000 patients or per general practitioner. In addition to routine, centrally-held data, the focus groups also suggested feedback of risk factors recorded in medical notes, such as weight, smoking status, alcohol consumption and blood pressure. In order to provide this data a manual audit of practice records was carried out by research team members following the Oxford 'rent-an-audit' methodology[25] for all participating practices that expressed an interest. The information provided in feedback is shown in Table 1.

The participating practices were stratified by district, number of partners, vocational training status and desire for risk factor audit and randomly allocated to one of three feedback groups: to receive graphical feedback in the form of management awareness profiles; to receive graphical feedback plus a visit from a medical facilitator; or to receive tabular feedback. The management awareness profile displayed each feedback item in graphical form with the highest, lowest and median values and 20th and 80th percentiles indicated, and the value for the individual practice clearly marked. A short written explanation of the display was provided. Four medical facilitators were nominated by the local medical committee and included the committee secretary, a committee member, and two academic general practitioners. An agreed protocol was used at all visits to ensure a consistent input; the facilitator's role was to discuss the practice's figures but to leave practices to identify changes which might be required. The practices chose which practice members would attend the facilitator visit.Visits by medical facilitators were timed to occur between four and six weeks after graphical feedback. Tabular feedback listed a practice's value for each item and the highest and lowest value in the group. The group that received tabular feedback was the nearest possible to a control, because information could not be completely withheld without risking disaffection.

During recruitment and before stratification, many practitioners questioned the quality of centrally-held data, mainly because this had not previously been seen by practices. Practices were therefore requested to validate this type of feedback where possible by comparing it with their own records.

On receipt of comparative feedback information, all general practitioners in the participating practices were asked to rate the feedback in terms of its acceptability and intelligibility and whether or not regular, for example annual, feedback in this form was helpful to the practice, using a questionnaire enclosed with the feedback. The significance of any differences between groups was measured, using the non-parametric Kruskal-Wallis test. Practice-level organizational responses to feedback were recorded via an extensive questionnaire completed by the

Table 1. Information provided in feedback and source of data.

Information provided	Data source
Practice demography No. of patients per GP (1000s); % of patients aged 0–5 years; % patients aged 5–15 years; % women aged 16–44 years; % patients aged 65–74 years; % patients aged 75+ years	FHSA
Staff Whole time equivalent (WTE) practice managers;[a] WTE practice nurses;[a] WTE practice secretaries/receptionists/dispensers/others	FHSA
Items of service (no. per quarter per GP) Cytology claims; night visit claims;[a] FP 1001 contraceptive claims;[a] FP 1002 contraceptive claims; temporary resident claims	FHSA
Cervical cytology % of eligible women aged 16–44 years with adequate smear recorded within 3 or 5 years;[a] % inadequate smear result for last smear record; % overdue for smear; % no recorded smear	FHSA
Developmental screening % of eligible children screened at 6 weeks;[a] % screened at 6 months; % screened at 9 months;[a] % screened at 27 months;[a] % screened at 42 months[a]	Child health units
Immunization % of eligible children receiving diphtheria, tetanus and poliomyelitis;[a] % receiving pertussis;[a] % receiving measles/MMR;[a] % receiving pre-school booster	Child health units
Live births, smoking and breastfeeding % of life births less than 2500 g; % live births 2500 g and over; % of mothers known non-smokers; % mothers known smokers; % of babies known breastfeeding at 1 month	Child health units
Laboratory tests (no. per year per 1000 patients) Haematology requests; biochemistry requests; bacteriology requests; cytology requests; immunology requests	Hospital
Risk factors % of eligible patients aged 35–64 years seen in last 5 years; % blood pressure recorded; % smoking habit recorded; % weight recorded; % alcohol habit recorded; % women had smear in last 5 years; % had smear over 5 years ago; % no smear recorded	Practice

[a]Information items tested for significant changes over time. FHSA = family health services authority. MMR = measles, mumps, rubella.

spokesperson in each practice. For each feedback item, the questionnaire asked whether the practice value was unexpected. The questionnaire then sought details of changes to practice procedures or services introduced in response to feedback. For practices receiving a medical facilitator visit, a second questionnaire completed by the spokesperson enquired about any additional changes introduced following the visit (the questionnaire was left with the practice at the visit). A final questionnaire completed by the spokesperson in all the practices 12 months after receipt of the feedback, recorded any changes introduced in the longer term in response to the original feedback.

Twelve and 24 months after the original data were collected, centrally-held data were again collected, converted into practice comparative format and fed back to the practices as before. Some of the items of information were available in the same format throughout this period (indicated on Table 1) and practice values for these were compared to identify any significant differences between the three feedback groups (Kruskal-Wallis test) and changes within groups over time (non-parametric Mann-Whitney test, two tailed). The data from the 12 and 24 month feedback of practice activity were analysed, grouping organizational aspects of a practice such as presence of separate clinics rather than a policy of opportunistic screening, computerization, training status, regular meetings, performance of audit, number of partners, and list size per partner. The relationship between preventive practice, as measured by rates of immunization, developmental screening and cervical screening, and claims on FP 1001 forms (contraception) and these organizational aspects was explored over time (Mann-Whitney test, two tailed). All analyses were performed using the *SPSS* statistical package.[26]

The cost of each form of feedback was estimated using 1991 prices. Costs were mainly those of staff time — time involved in liaison with relevant central data sources, time required to extract data by these agencies, time for subsequent analysis and production of practice information (staff costs were based on a grade five administrative post, including national insurance and superannuation costs; capital costs were excluded). The printing and postage costs of providing feedback were also included. Medical facilitator visits were costed at NHS hospital practitioner rates, plus travel costs. The manual audit of practice records was priced at medical audit assistant grade, and included travel costs.

The cost-effectiveness of the three feedback strategies was determined by comparing the costs of feedback with the incidence of reported effects, that is practices reporting changes as a result of feedback. This approach was adopted because observed effects could not accurately be quantified in money terms.[27,28] A similar cost per effect approach has been used to measure the cost-effectiveness of diagnostic information.[29,30]

Results

Of the 77 practices, 52 (68%) covering 378 508 patients or 78% of the local population, were recruited to the study. The 52 participating practices (197 doctors) contained a higher proportion of doctors qualified since 1970 than the 25 practices (62 doctors) not recruited (mean of 59% versus 39%). A significantly higher proportion of the participating practices were training practices than of those not recruited (23% versus 8%, $P<0.05$, Pearson chi square test from cross tabulation) and the participating practices had a lower percentage of doctors who were not UK graduates (mean of 10% versus 22%, $P<0.05$).

Of the 52 participating practices 22 had a computer (42%), 44 held regular meetings (85%) and 15 were engaged in some form of medical audit (29%). Thirty one of the 52 practices (60%) requested information on risk factor recording in their medical notes. Eighteen practices were allocated to the group receiving graphical feedback, 17 to the group receiving graphical feedback plus a visit from a medical facilitator and 17 to the group receiving tabular feedback (the corresponding numbers were 10, 10 and 11 for the 31 practices requesting information on risk factor recording).

Values for some of the information provided in feedback are shown in Table 2. This shows large scale variations between practices, with the potential for substantial improvements in some.

Responses from the practices indicated no problems with the validity of centrally-held data. The only discrepancies were found in the child health statistics in one of the three districts where a change of system was being introduced during the course of the study. Overall, 44 practices (85%) reported that the value of one or more of the information items for their practice was unexpected, though valid.

Table 3 shows that responses from individual general practitioners to the format of the feedback did not differ significantly between the three groups, other than a lower level of acceptability for feedback involving a medical facilitator visit ($P<0.05$, Kruskal-Wallis test). This group did not report significantly higher intelligibility or helpfulness of feedback.

The number and types of self-reported changes which were specifically linked to feedback varied with the type of information being considered. Only one change was made following receipt of information on practice demography — one practice set up a register of elderly patients when it discovered a surprisingly high level of patients aged 75 years and over, and at a later date implemented geriatric surveillance. However, two practices reported that they were increasing the hours worked by their nursing staff because of the information provided, and one that it would review staffing in general. Five practices reported that they would review their immunization procedures, and four that they were looking at developmental checks — in four of these nine cases they were establishing separate clinics. Fifteen practices reported that they would review their cytology claims (improving recording and claims procedures), increase pressure on women to attend, or review their cytology procedures (inadequate smears). Six practices were to examine their use of laboratory tests in greater detail. In total 36 practices (69%) reported at least one effect — 12 in the group receiving graphical feedback, 13 in the group which also received a visit from a medical facilitator and 11 in the group which received tabular feedback; this difference in overall incidence was not significant.

Of the 31 practices choosing risk factor audit of medical records, 10 (32%) reported at least one of the changes listed. These were distributed evenly across the three feedback groups; four practices in the group receiving graphical feedback, three practices in the group also receiving a visit and three practices in the group receiving tabular feedback.

There were no significant differences between the three feedback groups, or changes over time within groups, in terms of the values for the information items available in the same format over two years (indicated on Table 1).

Factors associated with a higher standard of preventive practice

From the first baseline data collection the 16 smaller practices (one or two partners) exhibited significantly higher values for several indicators of preventive practice than the 36 larger practices: percentage of eligible patients with cervical smears recorded within five years ($P<0.001$, Mann-Whitney test), blood pressure recorded ($P<0.05$), for whom developmental screening carried out at six months ($P<0.05$) and at two years ($P<0.01$), with immunization booster recorded ($P<0.01$), and seen within five years $P<0.001$). The 12 training practices exhibited similarly higher values than the 40 non-training practices among eligible

Table 2. Range of values for some information items for the 52 practices.

	Lowest value	20th percentile	Median	80th percentile	Highest value
Practice profile 1991					
No. of patients per GP (1000s)	0.5	1.5	1.8	2.2	3.3
No. of practice managers (WTEs)	0	0	1.0	1.6	5.6
No. of secretaries/receptionists/dispensers/others (WTEs)	2.8	5.9	6.2	7.0	9.4
No. of practice nurses (WTEs)	0	1.1	1.7	2.6	6.3
Developmental screening 1991[a]					
% of eligible children screened at:					
6 weeks	*3.3*	*68.9*	*86.7*	*93.7*	*100.0*
9 months	*3.4*	*54.9*	*86.5*	*94.3*	*100.0*
27 months	*4.4*	*66.7*	*85.7*	*100.0*	*100.0*
42 months	*2.3*	*53.5*	*91.7*	*100.0*	*100.0*
Immunization 1991					
% eligible children immunized:					
Diphtheria/tetanus/poliomyelitis	*66.6*	*78.1*	*86.6*	*100.0*	*100.0*
Pertussis	*60.0*	*72.6*	*83.7*	*93.3*	*100.0*
Measles/MMR	*65.8*	*77.4*	*89.8*	*95.4*	*100.0*
Pre-school booster	*31.3*	*58.7*	*69.3*	*80.0*	*100.0*
Women's services 1991					
% of women aged 16–44 years with:					
Hysterectomy	*3.0*	*6.0*	*9.0*	*13.0*	*18.0*
Adequate smear record in April 1991	*68.0*	*72.0*	*75.5*	*80.0*	*88.0*
Number of FP 1001 claims per quarter per GP	0.3	79.5	105.5	132.4	166.5
Adult prevention[b]					
% of men aged 35–64 years:					
Blood pressure recorded	*33.0*	*47.0*	*59.5*	*74.0*	*83.0*
Recorded as smokers	*4.0*	*10.0*	*16.0*	*23.0*	*37.0*
Recorded as non-smokers	*1.0*	*8.0*	*19.0*	*30.0*	*46.0*
Weight recorded	*2.0*	*12.0*	*22.0*	*41.0*	*59.0*
Alcohol habit recorded	*3.0*	*7.0*	*17.5*	*39.0*	*58.0*
% of women aged 35–64 years:					
Blood pressure recorded	*41.0*	*56.0*	*76.5*	*84.0*	*92.0*
Recorded as smokers	*2.0*	*6.0*	*10.0*	*19.0*	*38.0*
Recorded as non-smokers	*0*	*4.0*	*16.5*	*30.0*	*54.0*
Weight recorded	*4.0*	*19.0*	*28.0*	*55.0*	*83.0*
Alcohol habit recorded	*0*	*3.0*	*13.0*	*35.0*	*61.0*

WTE = whole time equivalent. MMR = measles, mumps, rubella. [a]For 38 practices. [b]For 31 practices.

patients for: cervical smears recorded within five years ($P<0.05$, Mann-Whitney test), FP 1001 contraceptive claims ($P<0.05$), smoking habit recorded ($P<0.01$), and alcohol habit recorded ($P<0.05$). Practices performing audit, holding regular meetings and with a small list size per partner exhibited fewer differences, only better smears and recording of one or two risk factors. Although list size per partner was highest for single-handed practices, there was no simple relationship between list size per partner and number of partners. The presence of separate clinics (rather than a policy of opportunist screening) was not significantly related to better associated preventive indicators, except for well men clinics which were associated with better weight recording among eligible men ($P<0.01$, Mann-Whitney test). Practices with cardiovascular, child development, well women or cervical clinics did not exhibit significant differences in associated preventive practice indicators from practices not holding these clinics. For practices with and without a computer, only records of women with smears recorded (but over five years ago) were greater for those practices with a computer.

Cost and relative cost-effectiveness of feedback

For the groups receiving graphical and tabular feedback the costs of one batch of feedback were identical — £44.60 per practice; this would fall to £31.80 if the feedback were provided routinely to all practices in the family health services authority. Each medical facilitator visit was costed at £59.60. The cost of the manual audit of practice records for risk factors was calculated to be £231.90 per practice (required an average of three person days per practice).

The relative cost-effectiveness of the three feedback strategies was measured on the basis of cost per effect for feedback provided routinely to all practices. This was calculated to be £46.10 per effect for graphical and tabular feedback, and £132.50 per effect for practices receiving a facilitator visit. The cost per effect for the manual audit of practice was much higher (£724.70).

Discussion

Few studies have measured the effects of feedback in general practice. Of those which have, the majority have concentrated on feedback to individual practitioners.[10–12,14–16] More recently, however, it has been argued that information at practice level may be more appropriate in influencing service delivery.[31] The present study demonstrates continuing high interest among practitioners in information feedback; recruitment to the study was similar to the high levels reported elsewhere.[6] It also demonstrates the feasibility of using centrally-held data to provide a wide range of information at the practice (or service delivery) level. The findings show that where practices were able to vali-

Table 3. Response of individual general practitioners to the information feedback.

	% of respondents in group receiving:		
	Graphical feedback (*n*= 30)	Graphical feedback plus medical facilitator visit (*n*= 27)	Tabular feedback (*n*= 31)
Acceptability rated 6–10[a]	*100*	*70*	*90*
Intelligibility rated quite/very easy[b]	*87*	*93*	*87*
Helpful to practice rated yes[c]	*67*	*67*	*65*

n = number of respondents in each group. [a]'Did you like this method of presentation?' rated from 0 = not at all to 10 = very much. [b]Scale of 4 categories: very/quite difficult, quite/very easy. [c]Scale of 3 categories: yes/no/do not know.

date centrally-held data, its accuracy was considered acceptable. In contrast, practice-held data have been criticized for widespread deficiencies.[32–34]

However, unlike other studies, no significant differences between the impact of tabular, graphical or medical facilitator feedback were demonstrated. Other research has shown that graphical feedback or, in particular, feedback which is supported by an educational exercise or visit from a clinical facilitator is more effective in producing behavioural changes.[11,19,35] Feedback in these cases has been at the individual practitioner level. At the practice level, the results presented here would appear to indicate that such differences are not significant. One possible reason may be that discussion between partners is necessary when feedback is at practice level, and therefore other factors come into play as well as presentational format. The fact that facilitator visits were not requested by practices may also have had some impact on the effectiveness of this form of feedback; there is some evidence that non-requested, or passive, feedback is less effective.[19] Finally, it may be that the timing of the study in relation to changes being introduced in general practice, combined with the type of data provided in feedback, produced a heightened receptivity to information feedback, resulting in reduced discrimination between formats of feedback.[5]

The economics of information use in health care have not been widely researched.[36] The effects produced by information cannot normally be quantified in money terms, making cost-benefit analysis impossible and requiring the use of cost-effectiveness measures, which are themselves not well developed.[28] In the present study, the main measure of effectiveness used (practices reporting changes following feedback) showed no difference in terms of cost per effect for graphical and tabular feedback. However, the cost per effect was much higher for practices receiving graphical feedback and a facilitator visit. This, coupled with lower reported acceptability, leads to the conclusion that this form of feedback is the least cost-effective of the three types evaluated here.

Unlike feedback using routinely collected central data, the cost per effect for audit of practice records for risk factors was very high. Even though feedback of this type might only need to be carried out every two years,[37] these results identify it as an expensive strategy for influencing practice behaviour. With increased computerization of general practice the cost of searching records will be reduced. However, it remains unclear whether improvements in risk factor recording influence patient health status; a direct relationship between changes in risk factor recording and improvements in patient outcomes has not been demonstrated.[38]

The finding that feedback produced organizational changes, but no significant changes in selected items of information (indicated on Table 1) might be due to the time required for organizational changes to work their way through to such output values, although even after two years no significant differences were evident in this study. However, it may also be that the changing context of general practice at the time had a confounding influence on some of these practice activity values. This is particularly true for immunization and cytology rates, where preventive practice target figures were introduced linked to payment scales.[39] This may have overshadowed any effects owing to feedback.

In the area of preventive care, the findings also identified certain practice characteristics as being related to a higher standard of preventive practice — whether a practice is a training practice, has a smaller list size per partner, holds regular meetings or performs audit. However, these characteristics were less important than practice size, smaller practices performing significantly better on the greatest number of indicators of preventive practice. This finding contradicts earlier results showing that larger partnerships, and those with a higher list size per partner, are more likely to provide effective preventive care and to be 'innovative'.[40] However, more recent research, in 45 widely distributed practices in the UK, indicates that low list size per partner and smaller practice list size are associated with improved preventive care, and the results of this study would appear to support this.[34]

Finally, it may be that although practices introduced changes in response to feedback, some of these were inappropriate. For example, the results indicate that the existence of separate clinics (a change which some practices reported setting in motion following feedback) rather than opportunistic screening is not necessarily associated with improved indicator values. Lawrence and colleagues have similarly found that separate clinics have no significant effect.[34] It has also been shown that separate clinics may only cover half the eligible population over a five year period.[41] The possibility of inappropriate responses to feedback highlights the need to analyse information centrally to discover which factors appear to be related to improved performance.[42] The results of any such analyses can then be incorporated in feedback to ensure that information is used appropriately.[43]

In conclusion, this study provides valuable information on how centrally collected data might be used most cost-effectively to develop information feedback at practice level. As attention becomes increasingly focused on general practice, practitioners themselves may request feedback to help plan and develop their services to patients. More research now needs to be directed at evaluating different information feedback strategies in primary care.

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